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GIFFORD PINCHOT, Forester.

TIMBER USED IN THE MINES OF THE UNITED STATES IN 1905.

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These statistics on the timber used in the mines of the United States in 1905 are based upon data gathered by the Forest Service in cooperation with the U. S. Geological Survey. The Geological Survey gives the number of mines as over 50,000. This includes, however, all excavations for the purpose of securing mineral products of any kind. In quarrying operations, placer mines, coal "strippings," and clay pits, tho they fall in this class, no timber is used; nor is any used by oil and gas wells, or salt works where salt is made from brine. There are also many small mines of other sorts, particularly in the West, in which timber is unnecessary. Nearly 14,000 mines were selected in which the use of timber seemed certain or possible, and from more than 5,000 of these reports were received showing that timber had been used. Nearly 9,000 mines reported no use of timber, and a small number of operators failed to report. It is probable that the resulting figures cover fully 90 per cent of the total amount of timber used during the year.

The operators were requested to report only the timber used underground, but it is probable that in some cases they failed to distinguish between timber for surface and underground use.

The reports were of such a character that in many cases the kind of wood used could not be determined. This accounts for the large items in the tables under the heading "Mixt" or "Not specified." On the other hand, it was possible in all cases to separate the material into round and sawed timber. The cost given for the timber represents the cost delivered at the mine. This is an extremely variable figure, since many operators cut their timber very near their mines and include in estimating its cost only the labor required to cut it.

Table 1 gives the kinds and the total quantity of timber used. The total amount reported was 165,535,900 cubic feet of round timber and 435,944,000 board feet of sawed timber. Reducing the sawed timber to cubic feet and combining with the round timber gives a total of over 200,000,000 cubic feet. Very little of the round timber was of such dimensions as to make possible its manufacture into sawed lumber; however, its total volume is equivalent to 1,986,430,800 board feet, which, added to the amount of sawed timber, makes a grand total of 2,422,374,800 board feet. Of the various kinds of timber used, it will be noted that pine constitutes half of the softwood round timber and about one-third of the softwood sawed timber. Fir and hemlock are next in importance, in nearly equal quantities. Of the hardwoods, oak, including over 28 million

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cubic feet of round timber and over 58 million board feet of sawed timber, has by far the greatest use in both forms. A great deal of oak is doubtless included also in the "Mixt hardwoods" and "Not specified" items.

TABLE 1.—*Kind and quantity of timber used in 5,163 mines in 1905.*

Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*
Pine	19,100,000	96,602,000
Fir	4,360,000	78,772,000
Hemlock	4,155,800	60,802,000
Spruce	1,104,200	5,403,000
Mixt softwoods	9,685,600	32,166,000
Total softwoods	38,405,600	273,745,000
Oak	28,174,400	58,693,000
Chestnut	1,543,800	908,000
Beech	522,900	1,597,000
Aspen	142,100	.....
Maple	136,600	5,973,000
Elm	117,200	932,000
Hickory	94,400	.....
Poplar	.....	475,000
Mixt hardwoods	54,915,100	60,333,000
Total hardwoods	85,646,500	128,911,000
Not specified	41,483,800	33,288,000
Grand total	165,535,900	435,944,000

Table 2 gives the total quantity and cost of the timber, by classes of mines. The cost of the round timber was over $9,000,000, and that of the sawed timber was over $7,000,000, giving a total of nearly $16,500,000. It will be noted that 2,940 bituminous coal mines used nearly $6,400,000 worth of timber, while 216 anthracite coal mines used over $4,400,000 worth, the average cost of timber per mine being $2,170 for the bituminous and $20,524 for the anthracite mines.

It will also be noted that the timber used in the 216 anthracite mines was of slightly greater value than that used in 1,718 mines for precious metals, the average cost per mine in the latter case being $2,564. Many of the precious metal mines are rather small, and are also in such solid rock that often little or no supporting timber is necessary. Timbering for iron mines is rather expensive, the average cost per mine for 143 mines being $6,395. In the miscellaneous class, which includes copper and other minerals, the average cost per mine for timber for 146 mines was $2,210, and 484 mines reported that no timber was used.

TABLE 2.—*Quantity and cost of timber used in mines in 1905.*

Mineral product.	Number of mines.	Round timber.		Sawed timber.		Total cost.	Average cost per mine.
		Cubic feet.	Cost.	Board feet.	Cost.		
Bituminous coal	2,940	91,309,700	$4,165,926	140,790,000	$2,214,005	$6,379,931	$2,170
Anthracite coal	216	43,676,000	2,898,063	101,210,000	1,535,062	4,433,125	20,524
Precious metals	1,718	15,282,500	1,340,808	164,956,000	3,064,882	4,405,690	2,564
Iron	143	13,484,000	728,350	13,929,000	186,099	914,449	6,395
Miscellaneous	146	1,783,700	118,917	15,059,000	203,775	322,692	2,210
Total	5,163	165,535,900	9,252,064	435,944,000	7,203,823	16,455,887	.....

The much higher cost of the timbering required for the anthracite mines is due to several causes. In the first place, many of the anthra-

cite workings lie at great depths, and some of the larger properties have many miles of gangways which have to be carefully maintained. They are below water level, and, as a result of the combined action of air and mine water, the timbers decay rapidly. Some of the beds are of enormous thickness, and require vast quantities of timber in the construction of "square sets" to support the roof and preserve the workings in overlying coal. Moreover, since the hills in the immediate vicinity of the anthracite mines have been largely denuded of timber suitable for mine supports, operators are obliged to obtain their supplies from considerable distances. The majority of the bituminous coal mines, on the other hand (particularly in the Eastern States), lie at comparatively moderate depths and above water level. The methods of mining frequently permit the withdrawal of the timber used for support in the "rooms;" the roof is allowed to fall in and the timber is used over a number of times. When "longwall" methods are employed timber is used only for the support of the gangways, and in some cases, where the roof is firm and the coal strong, may be entirely dispensed with.

BITUMINOUS COAL MINES.

Table 3 gives the kind and quantity of round and sawed timber used in 2,940 bituminous coal mines. In 907 bituminous mines no timber was used. The totals are 91,309,700 cubic feet of round timber and 140,790,000 board feet of sawed timber. By far the larger part of the timber consisted of hardwoods, among which oak predominated. Next to oak in importance are pine and hemlock, followed by fir, and chestnut and several other hardwoods in smaller quantities.

TABLE 3.—*Kind and quantity of timber used in 2,940 bituminous coal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Oak	22,592,500	55,082,000	Elm	117,200	801,000
Pine	4,374,200	10,101,000	Hickory	93,800	.....
Hemlock	2,267,900	5,599,000	Poplar	.....	475,000
Fir	1,919,100	6,074,000	Mixt hardwoods	45,464,400	36,183,000
Chestnut	1,107,900	760,000	Mixt softwoods	1,205,000	422,000
Beech	383,200	1,475,000	Not specified	11,390,300	19,228,000
Aspen	137,300	.....			
Maple	133,200	4,342,000	Total	91,309,700	140,790,000
Spruce	123,700	248,000			

In Table 4 are given the quantity and cost of the timber used in bituminous coal mines, by States. Pennsylvania, with 524 mines, used 37,826,000 cubic feet of round timber and 55,716,000 board feet of sawed timber, costing altogether $2,290,053. The average cost of the round timber was 3.5 cents per cubic foot and that of the sawed timber $17.39 per thousand board feet. In Illinois 400 mines used 10,342,300 cubic feet of round timber, costing 6 cents per cubic foot, and 7,025,000 board feet of sawed timber, costing $22.04 per thousand board feet, the total cost being $778,186. The 325 mines in West Virginia used 6,716,000 cubic feet of round timber and 19,645,000 board feet of sawed timber. The total cost was $561,061; that of the round timber being 4.6 cents per cubic foot, and that of the sawed timber $12.76 per thousand board feet. Next in order of total outlay

for timber come Ohio, with $471,730; Iowa with $232,148; Indiana with $220,209; and Alabama with $216,221. None of the other States used over $200,000 worth of timber.

TABLE 4.—*Quantity and cost of timber used in bituminous coal mines in 1905—by States.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Alabama	82	4,538,500	$0.038	4,372,000	$10.44	$216,221
Arkansas	34	876,200	.040	1,091,000	15.08	51,352
Colorado	69	1,315,500	.116	457,000	33.76	168,580
Illinois	400	10,342,300	.060	7,025,000	22.04	778,186
Indiana	162	3,126,400	.033	7,079,000	16.43	220,209
Indian Territory	38	1,765,400	.035	1,686,000	15.29	87,842
Iowa	161	2,306,000	.073	2,438,000	26.43	232,148
Kansas	89	922,800	.077	1,880,000	18.16	104,890
Kentucky	170	2,006,200	.041	5,332,000	12.03	106,610
Maryland	28	2,633,300	.057	2,555,000	15.42	188,471
Michigan	20	1,187,900	.051	938,000	18.11	77,664
Missouri	143	2,155,600	.040	1,185,000	18.04	107,817
Montana	26	617,600	.086	511,000	21.76	64,015
New Mexico	18	460,000	.105	1,023,000	12.18	60,745
North Dakota	37	119,600	.108	102,000	20.54	15,032
Ohio	399	4,427,700	.056	14,781,000	15.08	471,730
Pennsylvania	524	37,826,000	.035	55,716,000	17.39	2,290,053
Tennessee	88	2,405,900	.028	3,104,000	12.10	105,746
Texas	18	343,700	.042	1,304,000	16.68	36,355
Utah	13	338,100	.070	174,000	12.51	25,799
Virginia	30	894,900	.050	1,707,000	13.08	66,869
Washington	32	1,345,500	.050	5,649,000	5.58	98,747
West Virginia	325	6,715,000	.046	19,645,000	12.76	561,061
Wyoming	16	1,376,500	.104	444,000	16.93	151,138
All others (Georgia, Oregon, California, Idaho)	17	1,262,000	.....	652,000	.....	42,651
Total	2,940	91,309,700	.....	140,790,000	.....	6,379,931

Timber is seen to be more expensive in Colorado than in any other State. The average cost of the round timber in that State was 11.6 cents per cubic foot and that of the sawed timber $33.76 per thousand board feet. The large amount of mining has made a heavy demand for timber, and, altho most of the round timber is obtained locally, much of the sawed timber must be shipped in from considerable distances at high freight rates. Round timber in Wyoming and New Mexico cost 10.4 and 10.5 cents per cubic foot, respectively, or nearly as much as in Colorado; but the fact that sawed timber was obtained locally kept its price down to $16.93 per thousand in Wyoming and $12.18 in New Mexico. The lowest average price reported for round timber was 3.3 cents per cubic foot in Indiana, and for sawed timber $5.58 per thousand in Washington. It must be borne in mind, however, that in many cases the timber used was cut from land belonging to the mine operators, and the cost includes only cutting and hauling.

In the Appalachian region the bituminous coal beds lie above water level, while in the interior region, covering Indiana, Illinois, Iowa, Missouri, Arkansas, Kansas, and Indian Territory, the beds are generally below water level, and relatively more timber is required to offset decay.

ANTHRACITE COAL MINES.

In Table 5 is given the kind and quantity of timber reported by 216 anthracite mines. The total comprizes 43,676,000 cubic feet of round timber and 101,210,000 board feet of sawed timber. Of the

species used for round timber, yellow pine ranks first, with 8,348,000 cubic feet; of the sawed timber, hemlock furnishes 53,040,000 board feet, or over one-half of the total quantity. Oak ranks next, with 5,192,200 feet of round timber and 2,380,000 feet of sawed timber. A large amount of oak is also undoubtedly included under the item "Mixt hardwoods." Much of the pine is shipped in from the South, but most of the other timber used is cut in Pennsylvania.

TABLE 5.—*Kind and quantity of timber used in 216 anthracite coal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	8,348,800	12,054,000	Maple	2,200	1,449,000
Oak	5,192,200	2,380,000	Mixt hardwoods	8,533,000	23,847,000
Hemlock	985,000	53,040,000	Mixt softwoods	398,900	1,144,000
Chestnut	370,800	.....	Not specified	19,609,400	6,974,000
Beech	139,700	22,000			
Spruce	96,000	300,000	Total	43,676,000	101,210,000

Table 6 gives the cost of the timber used in 216 anthracite mines of Pennsylvania, to which State the production of anthracite coal is confined. The average cost of the round timber was 6.6 cents per cubic foot and that of the sawed timber $15.17 per thousand board feet; the total cost was $4,433,125. Comparing these figures with those for bituminous mines in Pennsylvania, in Table 4, it will be seen that, tho the values of the sawed timber are not far apart in the two cases, the cost of the round timber per cubic foot is nearly twice as great for the anthracite mines as for the bituminous. This is because most of the round timber for the bituminous coal mines is cut locally, whereas much of that for the anthracite mines consists of loblolly pine in large sizes which is shipped in at considerable expense.

TABLE 6.—*Quantity and cost of timber used in anthracite coal mines of Pennsylvania in 1905.*

No. of mines, 216..	Round timber.. 43,676,000 cubic feet, @ 6.6 cents per cu. ft. Sawed timber.. 101,210,000 board feet, @ $15.17 per M bd. ft.	Total cost.. $4,433,125

The 216 mines for which reports were received produced approximately 83 per cent of the total amount of anthracite coal mined in 1905. Assuming that the other mines used timber in the same proportions as those which reported—a fair assumption because of the uniform conditions thruout the anthracite region—it may safely be said that the total amount of timber used in all anthracite mines comprises not less than 52,620,000 cubic feet of round timber and nearly 121,620,000 board feet of sawed timber, costing over $5,340,000. As the total tonnage of anthracite mined in 1905 was 69,339,152 long tons, the cost of timber was 7.7 cents per long ton of coal mined.

MINES FOR PRECIOUS METALS.

The kind and quantity of timber used in 1,718 mines for precious metals is given in Table 7. In 6,981 mines no timber was used. The total amount of round timber was 15,282,500 cubic feet and of sawed timber 164,956,000 board feet. Since these mines are located

entirely in the Rocky Mountain and Pacific Coast regions, where the native timber consists largely of softwoods, very little hardwood is used in them, and most of this is probably aspen, altho the reports were not specific on this point. Pine ranks first, with 4,851,500 cubic feet of round timber, and 67,343,000 board feet of sawed timber, followed by fir, with 2,436,400 cubic feet of round and 72,441,000 board feet of sawed timber. Spruce comes third, with 829,600 cubic feet of round and 4,642,000 board feet of sawed timber. The "mixt softwoods," which consisted principally of pine, fir, and spruce, show 6,471,500 cubic feet of round and 19,624,000 board feet of sawed timber.

TABLE 7.—*Kind and quantity of timber used in 1,718 precious-metal mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	4,851,500	67,343,000	Mixt hardwoods	28,900	.....
Fir	2,436,400	72,441,000	Not specified	664,600	906,000
Spruce	829,600	4,642,000			
Mixt softwoods	6,471,500	19,624,000	Total	15,282,500	164,956,000

In Table 8 is given the quantity and cost of timber used in the precious-metal mines. Montana comes first, with 127 mines, which required 3,390,800 cubic feet of round and 62,341,000 board feet of sawed timber, representing a total cost of $1,265,838 and an average cost of 9.4 cents per cubic foot for round timber and $15.20 per thousand for sawed timber. Next in order comes Arizona, in which 139 mines used 1,045,500 cubic feet of round and 40,498,000 board feet of sawed timber, with a total cost of $1,034,614. In Arizona the average cost of round timber was 10.2 cents per cubic foot and of sawed timber $22.91 per thousand board feet. Then, in order of total cost of timber used, come California, with 289 mines and a cost of $499,329 for timber; Colorado, with 399 mines and a cost of $462,893; Utah, with 118 mines and $455,599; Idaho, with 157 mines and $357,475, and Nevada, where 133 mines used timber costing $144,519. A relatively small amount of timber was used in mines for precious metals in other States.

TABLE 8.—*Quantity and cost of timber used in precious-metal mines in 1905—by States.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Arizona	139	1,045,500	$0.102	40,498,000	$22.91	$1,034,614
California	289	3,947,400	.076	10,847,000	18.41	499,329
Colorado	399	2,666,300	.087	11,966,000	19.23	462,839
Idaho	157	2,083,500	.103	9,876,000	14.41	357,475
Montana	127	3,390,800	.094	62,341,000	15.20	1,265,838
Nevada	133	81,700	.040	3,603,000	31.10	144,519
New Mexico	59	274,800	.042	762,000	19.07	26,152
Oregon	114	427,000	.061	2,569,000	13.04	59,556
South Dakota	69	486,800	.080	2,020,000	18.31	75,883
Utah	118	730,900	.069	19,150,000	21.17	455,599
Washington	50	61,400	.072	1,133,000	9.95	15,727
Wyoming	64	86,400	.053	191,000	18.69	8,159
Total	1,718	152,825,000	.....	164,956,000	.....	4,405,690

The highest average cost reported for round timber was 10.3 cents per cubic foot in Idaho and 10.2 cents in Arizona. The highest average cost for sawed timber was $31.10 per thousand in Nevada, which also reports the lowest cost for round timber—4 cents per cubic foot. The explanation of this apparent anomaly is that the small amount of round timber used is chiefly cut at little cost in the vicinity of the mines, while almost all of the sawed timber is shipped in at high freight rates.

IRON MINES.

In Table 9 are given the kind and quantity of timber used in 146 iron mines, 422 mines reporting that no timber was used. This consisted of 13,484,000 cubic feet of round and 13,929,000 board feet of sawed timber. Pine ranks first, with 1,177,500 cubic feet of round and 5,209,000 board feet of sawed timber, followed by hemlock, with 901,400 and 1,783,000 for round and sawed, respectively. Oak comes third, with 117,700 cubic feet of round and 280,000 board feet of sawed timber. Small amounts of spruce, fir, and maple were reported. The figures under the items of "Mixt" and "Not specified" are so large for the iron mines that the amounts for the species given are not at all accurate. Were accurate figures available the figures for pine, hemlock, and oak would be largely increased.

TABLE 9.—*Kind and quantity of timber used in 146 iron mines in 1905.*

Kind.	Round timber.	Sawed timber.	Kind.	Round timber.	Sawed timber.
	Cubic feet.	*Board feet.*		*Cubic feet.*	*Board feet.*
Pine	1,177,500	5,209,000	Mixt hardwoods	651,700	187,000
Hemlock	901,400	1,783,000	Mixt soft woods	1,324,800	890,000
Oak	117,700	280,000	Not specified	9,261,600	5,131,000
Spruce	49,300	11,000			
Fir		256,000	Total	13,484,000	13,929,000
Maple		182,000			

Table 10 gives the quantity and cost of timber used in iron mines. In Michigan 40 mines took 11,414,700 cubic feet of round timber and 10,549,000 board feet of sawed timber, having a total cost of $669,323. The average cost of the round timber was 4.7 cents per cubic foot, and of the sawed timber $12.24 per thousand. The predominance of Michigan in the production of iron ore is strikingly shown by these figures, as this State used 85 per cent of the round timber and 76 per cent of the sawed timber required by all the iron mines from which reports were received. The relative order in which the other States used timber for iron mines is: Minnesota, Colorado, New Jersey, Alabama, Pennsylvania, and Virginia.

TABLE 10.—*Quantity and cost of timber used in iron mines, by States, in 1905.*

State.	Number of mines.	Round timber.		Sawed timber.		Total cost.
		Cubic feet.	Cost per cubic foot.	Board feet.	Cost per M board feet.	
Alabama	18	183,700	$0.078	314,000	$15.05	$19,111
Colorado	19	359,100	.145	1,095,000	19.81	73,820
Michigan	40	11,414,700	.047	10,549,000	12.24	669,323
Minnesota	25	756,000	.097	1,222,000	12.56	88,450
New Jersey	11	462,400	.073	258,000	21.33	39,365
Pennsylvania	14	147,900	.055	398,000	21.37	16,577
Virginia	16	160,200	.041	93,000	13.48	7,803
Total	143	13,484,000		13,929,000		914,449

STATES IN WHICH THE COST OF MINING TIMBER IN 1905 EXCEEDED $500,000.

In eight States the cost of timber used in mines in 1905 exceeded half a million dollars each. These States are given in order of relative importance in Table 11. Pennsylvania is unique in possessing all the anthracite mines, and, in addition, the most and the largest bituminous coal mines, as well as a number of iron mines. The timber used by 754 mines in this State amounted to 47,606,500 cubic feet of round and 157,324,000 board feet of sawed timber, having a total cost of $6,739,755, or five times the cost of the timber used in the mines of any other State. In Montana 153 mines for precious metals and bituminous coal used 4,008,400 cubic feet of round timber and 62,852,000 board feet of sawed timber, costing altogether $1,329,853. In Arizona 139 precious-metal mines required 1,045,500 cubic feet of round timber and 40,498,000 board feet of sawed timber, having a total cost of $1,034,614. It is the high cost of timber rather than the large amount that gives Arizona such a prominent place, for the quantity used was actually less than that given for any other State in Table 11. In Illinois 400 soft coal mines required 10,342,300 cubic feet of round and 7,025,000 board feet of sawed timber, costing $778,186. Then follows Michigan with a total cost for timber of $746,987, West Virginia with $561,061, Colorado with $605,239, and California with $503,124.

TABLE 11.—*States in which the cost of mining timber in 1905 exceeded $500,000.*

State.	Number of mines.	Round timber.	Sawed timber.	Total cost.
		Cubic feet.	*Board feet.*	
Pennsylvania	754	47,606,500	157,324,000	$6,739,755
Montana	153	4,008,400	62,852,000	1,329,853
Arizona	139	1,045,500	40,498,000	1,034,614
Illinois	400	10,342,300	7,025,000	778,186
Michigan	60	12,602,600	11,487,000	746,987
West Virginia	325	6,716,000	19,645,000	561,061
Colorado	487	4,340,900	13,518,000	605,239
California	291	3,971,200	10,942,000	503,124

Approved:
JAMES WILSON,
Secretary.

WASHINGTON, D. C., *October 16, 1906.*

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